

into the latter from the east, about five miles north of the Laloki. From this point a portion of the party travelled eastward, between the Mawmika and the Laloki, towards the Astrolabe range, through open forest country, hoping to reach the table-land seen from the spurs of Mount Owen Stanley in their first journey. After about forty miles they met with magnificent waterfalls (about 150 ft.) on the Laloki, and on the fourth day reached the table-land after great labour. They went along it for twenty miles, when their further advance on horseback was stopped by the scrub. Two of the party remained with the horses, while three others, led by three natives carrying provisions, went through the scrub for thirty miles, and struck the head waters of the Goldie. They then proceeded for six miles in each direction, and found, after their great toil, that they had got entirely away from all indications of gold. They returned to the Laloki camp after an absence of thirty-two days, and since then no exploring work has been done. The members of the expedition still maintain that good gold must exist, and they propose to return to Top Camp, and thence to cross a small range to the north-west, from which the gold found in the Goldie River is supposed to have come; from that point they hope to get to another river supposed to run under Mount Owen Stanley, in the direction of Redscar Bay. The total distance traversed by the party during their three prospecting trips was 370 miles, and throughout the whole of that distance not half a grain of gold was discovered.

EARLY in the summer Mr. J. V. Williams was sent to New Caledonia to inspect the nickel mines there on behalf of an English smelting company, and we learn from an Australian contemporary that he thinks most favourably of their prospects. The mines extend from Noumea northwards, along the coast for 120 miles, and the French authorities, disheartened by the inefficient manner in which mining has hitherto been carried on in the island, are said to be prepared to give an English company all reasonable assistance and encouragement.

FROM a Singapore paper we learn that Baron Overbeck and Mr. Alfred Dent, the promoters of the cession of a portion of Northern Borneo to an English company, to which we referred some few months back, arrived at that port at the end of August, after a visit to the lately-ceded territory. They state that matters are quiet there, and that no disturbances are apprehended. A Ceylon planter who went to report upon the adaptability of the soil of the territory for planting purposes, is of opinion that coffee might be cultivated on the west coast, while on the east coast the sugar-cane and other products which usually flourish in the same soil, would thrive well. Altogether the most sanguine expectations appear to exist as to the productiveness of the country.

THE WERDERMANN ELECTRIC LIGHT

WHILE the world is waiting for the announcement of Mr. Edison's method of splitting up the electric light, Mr. Richard Werdermann, a gentleman well known in connection with electric lighting, seems to have solved the problem, to some extent, at least, and he believes that after further experiments he will be able to divide the current into 50, 100, or even 500 lights. Experimental exhibitions of the light have been given with satisfactory results at the works of the British Telegraph Manufactory, Euston Road.

The chief object of Mr. Werdermann is to demonstrate that a number of lights can be placed in one circuit, the current being produced by an electroplating Gramme machine, having an electromotive force of 4 to 4½ Daniell cells. The principle of Mr. Werdermann's invention is that of keeping a small vertical pencil of carbon in contact with a large disk of the same material. In some earlier experiments he found that when he increased the

sectional area of the one carbon and reduced that of the other, he produced an electric light with the carbons in actual contact, a small arc appearing at the point of contact. The small carbon is a pencil 3 mm. in diameter; the upper or negative carbon is a disk of 2 inches diameter and an inch thick. The upper carbon is not consumed, so that the waste takes place only in the lower.

In his lamp he places the disk uppermost with the pencil vertically beneath it, sliding up a metal tube which acts as a guide and contact. The pencil is kept in contact with the disk by means of chains attached to its lower extremity passing over pulleys and down again to a counterweight of about 1½ lb. About ¾ in. of the lower carbon appears above the tube, and is rendered incandescent by the passage of the current between it and the disk. This pencil is pointed, and retains this point all the time of burning. It is between this point and the disk that the small electric arc appears which gives the greater part of the light.

At the exhibitions which have been given only ten lights were in circuit at once, Mr. Werdermann having no more lamps at hand. The lights were put in what is called the parallel circuit, that is, they all branched off from one wire of the machine and met again on the other. The lamps were estimated to give a light of forty candles each, and the results obtained were most satisfactory, all the lights burning equally well, giving a beautiful white light, which was perfectly steady. By this system of lighting a large number of lamps could be lighted simultaneously, could be put out, and again re-lit. If one lamp should be extinguished it does not affect the others, except by making them burn slightly brighter; but this effect will be obviated by a switch arrangement for regulating the current of the extinguished lamp. The current produced by the machine being very low in tension, the insulation of the conducting cables could be cheaply and easily maintained.

We may state that two larger lamps were shown of 360 candles each. The effect of the light is not dazzling to the eyes, and it was shown naked; in actual practice a common glass globe, as in the ordinary gas lamps, will be a sufficient protection.

NOTES

WE are requested to state that on the occasion of Prof. Wurtz's Faraday lecture at the Royal Institution on Tuesday next, the visitors' tickets issued by the Chemical Society entitle ladies as well as gentlemen to admittance.

SOME of our readers may be aware that Mr. Alfred Russel Wallace is a candidate for the post of Verderer of Epping Forest. We are sure no one can be better fitted than Mr. Wallace to perform the duties attaching to such an office, and as, so far as we know, no more suitable candidate has appeared, the duty of those who have the filling-up of the appointment is plain.

It is with regret we announce the death of Mr. Charles R. Thatcher, the well-known conchological collector. It will be remembered that we alluded a few months ago to the number of genera and species of shells lately described, due to the indefatigability of this gentleman, including the unique and wonderful *Thatcheria mirabilis*, described in the *Proceedings of the Zoological Society* by Mr. G. F. Angas, and the *Delphinulopsis Lesourdi*, described by Mr. Bryce-Wright in the *Journal de Conchyliologie*, Paris. Mr. Thatcher started, a few months ago, on a five years' collecting tour, and had made the most perfect arrangements for deep-sea and shallow dredgings. He was attacked suddenly by fever, and died a few days after his arrival at Shanghai. There is no greater loss to conchological science than this gentleman's death, as he was undoubtedly the most successful collector of the day.

PROF. F. V. HAYDEN has recently been elected honorary member of the Société Vaudoise des Sciences Naturelles, Lausanne, Switzerland; Société Malacologique, Brussels, Belgium; and the Geographical Society of Halle, Prussia.

It is announced that the Sheffield meeting of the British Association will begin, not on August 6, but August 20, 1879.

FROM a Government Minute we have received from Mauritius, we learn that the governor, Sir Arthur Phayre, laid before the council of July 20 an application from the President of the Meteorological Society of Mauritius for a grant of money, in order that the results of the meteorological observations made during many years by Dr. Meldrum, the Government observer, may be published in a form which will be advantageous to science and to navigation, as well as to commerce. The form which it is proposed the publication shall take is twofold, namely: synoptic weather charts for the Indian Ocean, extending over twelve consecutive months, and a storm atlas of the Indian Ocean, exhibiting the principal results which have been obtained respecting the more marked atmospheric disturbances in the Indian Ocean during the last thirty years. The objects are set forth in detail in a report by Dr. Meldrum, of which a copy is annexed to the Minute. The matter was referred to the Finance Committee, who, we trust, will grant the sum asked for. If they have any regard to the interests of navigation and commerce in the Indian Ocean, there can be no doubt as to their decision.

COMMANDER PERRIER has been making some interesting experiments with the Giffard captive balloon for the purpose of comparing the qualities of the best aneroid barometers selected from the Paris Exhibition. Each French maker who obtained a silver medal sent two instruments, which were sent up five or six times, and compared with a standard Fortin barometer placed at the foot of the cable. It was discovered that very few of these barometers recovered their original readings until after the lapse of a considerable time. Some photographs were taken of Paris at this high altitude, and are most interesting, although the motion of the car has caused some want of distinctness in the parts removed from the centre of station.

SOME interesting objects have recently been brought to light from the lake-dwellings in the lake of Neufchatel, and are now exhibited at the Neufchatel Museum. Amongst them are three particularly worthy of notice: (1) a large and extremely well preserved piece of amber; (2) a golden earring of masterly workmanship, of the bronze age; and (3) a canoe cut out from the trunk of a single oak tree in perfect preservation. Its length is 7 metres, its breadth 55 centimetres at the prow, and 65 centimetres at the stern; its depth is 19 centimetres, its total height from 22 to 24, and the thickness of its sides 6 to 8½ centimetres.

NEWS from Panama states that the volcano Cotopaxi is in a state of violent activity. Its crater is surrounded by ice and snow, but the clouds of ashes and smoke rising from it can be seen even at Guayaquil on the shores of the Pacific.

THE *Daily News* Naples Correspondent under date November 2, telegraphs that after numerous variations the activity of the eruption of Vesuvius appeared to be then at its height. The lava flowed into the same ravine into which it fell during the eruption of 1872. The seismographs denoted an approaching increase in the eruption.

Two fresh shocks of earthquake are reported from Buir (Rhenish Prussia), of which the first was felt for many miles around. It occurred on October 24, at 12.30 A.M., and the second one on the same date at 3.45 P.M.

A VIOLET-COLOURED meteor, with a reddish train, was seen at Stanislas, Austria, on the evening of the 24th in the Great

Bear and moving in a northerly direction. It is described as thrice the size of Jupiter.

IN NATURE (vol. xviii. p. 652) we gave an account of a verification of M. Pervouchine's first result (vol. xviii. p. 104). We have now seen a very short and neat verification not only of Pervouchine's first but also of his second result (vol. xviii. p. 456). The author (Mr. John Bridge, M.A.) uses the scale whose radix is 16 instead of the binary scale. He assumes r_n to be the remainder arising from the division of 2^{2^n} , then since $2^{2^{n+1}} = (2^{2^n})^2$, it follows that r_{n+1} is the remainder arising from the division of $(r_n)^2$. Hence the remainders can be successfully calculated. Thus for the first result the divisor is (in scale 16) 1(12)001

$$\begin{aligned} \therefore r_5 &= -5249, r_6 = +9(11)4, r_7 = -59(10)6, \\ r_8 &= + (12)5(11)4, r_9 = -10(10)(15), r_{10} = +1702, \\ r_{11} &= + (13)(10)(13)6, r_{12} = -1. \end{aligned}$$

Hence $2^{2^{12}}$ has remainder -1 , and therefore $2^{2^{12}} + 1$ is divisible $7 \times 2^{14} + 1$. The second result is obtained in the same manner, the divisor being $(10)(16)^6 + 1$, i.e., $(10)000001$, and the last remainder r_{23} . These verifications have been presented to the London Mathematical Society by the author.

A SUPPLEMENT to No. 37 of the *Boletín de la Institución libre de Enseñanza* consists of a prospectus giving an account of its aims and of its statutes, which we sketched out in a former notice of the Institution. It also contains a list of officers (among the four honorary professors we notice the names of John Tyndall, de Londres, and Charles Darwin, de Londres) and of the courses of lectures for the students. We have received, also, a copy of the Vice-Rector's (Montero Rios) address, "Las Elecciones Pontificiales." Among other papers read at the *conferencias* we note "El Agua y sus Transformaciones," por D. Francisco Quiroga; "Relaciones entre la Ciencia y el Arte," por D. Federico Rubio; "Teorías Modernas sobre los Funciones Cerebrales," por D. Luis Simano; "La Vida de los Astros," por D. A. G. de Linares. No. 33 has papers on "La Geometría Sintética" (continuation); "Los Principales Publicaciones sobre Plantas Insectívoras" (two by Mr. F. Darwin are noticed), and the catalogue of the "Colección de Rocas," in the Natural History Cabinet is proceeded with.

THERE has been opened at Berlin the Telegraphic Museum established by M. Stephan, the General Director of Postal Telegraphs in Germany. The exhibition has been located in two large rooms of the General Post Office at Berlin. This is not the first institution of the kind, a telegraphic museum, and even laboratory, having been established at Tokio by the Japanese Government for the use of the pupils in telegraphic engineering. A number of interesting experiments have been already made in that laboratory under the guidance of Messrs. Ayrton and Perry.

WE have received the *Transactions* of the Norfolk and Norwich Naturalists' Society for 1877-8. The society is now in its tenth year, and is both financially and numerically stronger than at any previous period of its existence, the number of members being nearly 190. A glance at the contents of the part shows that the society is fairly carrying them out. We would particularly call attention to the series of letters on the ornithology of Norfolk, by eminent deceased naturalists, edited by Prof. Newton. The society is making it a feature of its work to rescue all such valuable records from loss. The society is also endeavouring to rescue from oblivion the memory of men who did good work in their time, but are fast being forgotten. The complete meteorological report is also an annual contribution; the observations are recorded by the valuable set of instruments, the property of the Norwich Meteorological Society. Mr. Stevenson's "Ornithological Notes" are also continued from year to year. The last paper is perhaps the most important: it is part viii. of a carefully compiled fauna

and flora of the county. The subjects of the previous parts have been mammals, reptiles, marine, fresh-water, and land shells, fungi, lepidoptera, flowering plants and ferns, diatomacæ. Other sections will follow as opportunity occurs. We have also received the *Proceedings* of the Norwich Geological Society, part i., which contains some interesting papers, a creditable Fourth Annual Report of the Lisburn School Association, and a satisfactory Report of the Committee of the Goole Scientific Society, which is in its third year.

WE have received the programmes of the arrangements for the session of the various association societies of Cumberland, of the organisation and activity of which we have had already occasion to speak. The programmes seem to us on the whole very satisfactory.

A FINE statue of Corinthian metal resting upon a marble pedestal has just been found through excavations which are being made at the Ponte Sisto at Rome. The statue is 3 metres high and is slightly damaged; the right arm is entirely broken off; yet it is hoped that the damage is not beyond repair. The general belief among archæologists is that the statue represents the Emperor Probus.

AT Berlin a "Society for Ornithology and the Protection of Birds" has just been formed, under the presidency of Dr. Karl Russ. It consists of about fifty members at present, amongst whom there are numerous eminent ornithologists. The special purposes of the new Society are the discussion and practical testing of ornithological questions in regular meetings, the establishment of frequent ornithological exhibitions on as large a scale as possible, and the delivery of public lectures on the science of birds in all its branches.

M. NICOLLE, the organiser of the Exhibition of Maritime and River Industries, which took place at the Palais de l'Industrie, Champs Elysées, in 1876, has received from the French Government, authority to use the same building in 1879 for an exhibition of science applied to industry. M. Nicolle is now busy making his arrangements for next spring. We understand that a very large place will be devoted to the wonders of electricity. This exhibition is opened to all nations, and scientific exhibitors at the Champ de Mars and the Trocadéro will receive circulars giving details before the close of the exhibition. A sum of 700,000 francs has been voted out of the National subscription for covering the travelling expenses of 5,000 working men to the exhibition. A sum of from 4*l.* to 6*l.*, according to distance, has been handed over to each of the chosen delegates, and the railway companies have agreed to take only half of the ordinary fares.

FROM America we have received from the twenty-first to the twenty-eighth annual reports of the New York State Museum of Natural History, edited by the regents of the University of the State of New York. Their contents are of the highest interest, comprising many geological, botanical, and zoological communications of value. Amongst others we note an elaborate paper (with map) on the Niagara and Lower Helderberg groups, their relations and geographical distribution, by Dr. James Hall, the director of the museum; numerous entomological contributions by J. A. Lintner; an account of an ascent of Mount Steward and its barometrical measurement, by Verplanck Colvin; remarks on some peculiar impressions in sandstone of the Chemung group, New York, by Dr. Hall and R. P. Whitfield; notes and observations on the Cohoes Mastodon, by Dr. J. Hall. Each part contains a number of well-executed plates. We may, at a future date, return to some of the contents at greater length. We have also before us the *Transactions* of the Academy of Science of St. Louis (vol. iii. No. 4); the principal contents are a valuable treatise by Prof. G. Seyffarth, entitled "Corrections of the present Theory of the Moon's Motions according to

the Classic Eclipses;" a note on the larval characters and habits of the blister beetles, by Charles T. Riley; a synopsis of American firs, by Dr. George Engelmann, and other botanical communications by the same gentleman. Also the following publications of interest for entomologists:—Collecting Butterflies and Moths, by Montagu Browne; Preliminary Studies on the North American Pyralidæ, by A. R. Grote; Butterflies and Moths of North America, by Herman Strecker; Lepidoptera, Rhopaloceres, and Heteroceres, by the same (Nos. 14 and 15).

M. W. DE FONVIELLE writes us that Capt. Howgate has not forgotten the suggestion made by him of utilising for ballooning purposes the magnificent coal seam discovered by our Arctic Expedition on the shores of Lady Franklin Bay. Capt. Howgate has made use of the delays arising from the slowness of Congress in granting the required credit for his Arctic colony, in having experiments made to ascertain whether it is possible to inflate balloons without recurring to the ponderous process of preparing ordinary lighting gas. From a report on the experiments which have been made by Prof. Samuel King in the inflation of the "King Carnival," we learn that great success has been met with. The inflation, we are told, was accomplished successfully throughout in seven hours' time. Gas for the purpose was supplied by what may be termed a five-foot generator of the Lowe pattern or build, which employs the modern method of a steam in conjunction with an air blast. Five charges or turns were required to fill the balloon. The amount of gas produced by each charge or turn approximated 6,000 cubic feet. As will be inferred from the two last statements, the capacity of the balloon is about 30,000 cubic feet. The generator employed could have filled the balloon in less than six hours, and would have done so had not the operations been purposely delayed, which delay was occasioned by a state of weather somewhat unfavourable to the ascension which it was proposed to make. The external dimensions of the generator are, height eleven feet, diameter five feet. It is cylindrical in shape, and has an inside fire-brick lining of about six or seven inches thickness, thus leaving a clear diameter for generating purposes of less than four feet. About ten inches of the height is also taken up by the bottom lining. The gas for the inflation was made from anthracite coal. Steam is passed through the incandescent coal. There comes from the generator an impure hydrogen gas containing carbonic acid and oxide of carbon. The carbonic acid is then removed by a suitable and familiar process, and the carbonic oxide remains with the gas. About forty-six lbs. buoyancy is obtained to every thousand feet of gas. The cylinder of the generator can be made in sections, of cast-iron, if no fire-bricks are used, and of wrought-iron if fire-bricks are used. The sections can be luted with clay and then bolted together. The results of these interesting experiments will be laid before the Geographical Society of Paris and Minister of War of France. M. De Fonvielle inquires whether it is really hopeless to find a liquid which might absorb the largest quantity of carbonic oxide, and restore to the hydrogen gas its natural buoyancy.

It is stated that a committee is being formed in Paris with a view to a permanent International Exhibition at the Crystal Palace. French exhibitors are invited to transfer their productions from the Champ de Mars to Sydenham, and thus realise the original idea of the Crystal Palace as a cosmopolitan museum and warehouse.

WE have received from Mr. Clifton Ward two papers by him reprinted separately—"Quartz as it Occurs in the Lake District," and "Notes on Archæological Remains in the Lake District."

WE have on our table the following books:—"A Manual of Anthropometry," by Charles Roberts, F.R.C.S. (J. and A. Churchill); "The Art of Scientific Discovery," by G. Gore,

L.L.D., F.R.S. (Longmans); "Dogma, Doubt, and Duty," by Charles Hoare (Aston and Mander); "Leisure-Time Studies, Chiefly Biological," by Andrew Wilson, Ph.D., F.R.P.S.E. (Chatto and Windus); "Medicinal Plants," Parts 32 to 35, by Robert Bentley, F.L.S., and Henry Trimen, M.B., F.L.S. (J. and A. Churchill).

THE additions to the Zoological Society's Gardens during the past week include a Toque Monkey (*Macacus pileatus*) from Ceylon, presented by Mrs. Tranchell; two Macaque Monkeys (*Macacus cynomolgus*) from India, presented by Mr. C. Loveless; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. Henry Hands; a Grison (*Galictis vittata*) from South America, presented by Mr. H. Potier; a Common Hedgehog (*Erinaceus europæus*), European, presented by Mr. Edwin Etty Sass; a Common Boa (*Boa constrictor*) from South America, presented by Mr. D. W. Bell; two South American Snakes (*Zamenis hippocrepis*) from South America, presented by Mr. G. H. Hawtayne; two Small-Scaled Mastigures (*Uromastix microlepis*) from Busreh, presented by Capt. Phillips; a Mesopotamian Fallow Deer (*Dama mesopotamica*) from Mesopotamia, deposited; two Japanese Pheasants (*Phasianus versicolor*) from Japan, a Gold Pheasant (*Thaumalea picta*) from China, a Lineated Pheasant (*Euplocamus lineatus*) from Pegu, two Barred-Tailed Pheasants (*Phasianus reevesi*) from North China, a Siamese Pheasant (*Euplocamus prolatius*) from Siam, two Swinhoe's Pheasants (*Euplocamus swinhoei*) from Formosa, a Bewick's Swan (*Cygnus bewickii*) from North Asia, purchased.

ON THE VERTICAL DISTRIBUTION OF THE LIGHT FROM LIGHTHOUSES PLACED AT HIGH ELEVATIONS ABOVE THE SEA-LEVEL

THE strongest beam of rays proceeding from lighthouse apparatus in high towers is sent to the sea horizon, as being the direction in which the light can be seen at the greatest distance in clear weather.

My late brother, Mr. Alan Stevenson, suggested the dipping of dioptric lights below the normal to a plumb line in his Report of December 10, 1839, to the Commissioners of Northern Lighthouses in the following passage:—"A more serious inconvenience in using catadioptric zones is that in very high towers where some correction of the position of the apparatus becomes necessary so as to direct the rays to the horizon, the means of regulating the zones in a manner similar to that used for the mirrors is inapplicable. The adoption of a high point in the flame for the focus of these zones, however, affords a considerable compensation for this defect, and it might even be entirely obviated by constructing each set of zones of the form suited to the known height of each tower and the required range of each light if such a correction were found to be of sufficient importance to warrant its application."¹

But though the precaution of dipping the strongest of the light to the sea horizon was followed out by Mr. Alan Stevenson in high towers it was not always attended to, till the year 1860, when Mr. J. F. Campbell, the Secretary of the Royal Commission on Lighthouses, brought the subject prominently forward, and suggested the internal mode of adjustment. Since then the strongest beam has been invariably dipped to the horizon.

It must, however, be remembered that when the weather becomes even in the least degree thick or hazy, not to say foggy, the range of the light is greatly curtailed by atmospheric absorption and refraction; which last produces during fogs irregular diffusion of the light in every plane. So that at high towers where the beam is pointed to a very distant horizon, it is obvious that the strongest light is directed to a part of the sea, where it cannot be seen with certainty unless when the weather is exceptionally clear.

In an interesting paper on what he calls the "horizontal visual penetrability of the atmosphere," lately published in the *Journal* of the Scottish Meteorological Society,² Mr. A. Cruikshanks,

¹ "On the Application of Catadioptric Zones to Lighthouses," by Alan Stevenson, L.L.B. (Edinburgh, 1840.)

² *Journal* of the Scottish Meteorological Society, new series, vol. v. p. 97.

M.A., makes the following remarks as to daylight observations:—"This shortening of the range of view arises from various atmospheric causes. Such obstructions to the horizontal view as low clouds or mists, or falling showers of rain, snow, or hail circumscribe it at once or abruptly from the observer at a distance of from a few yards to many miles off. The other great obstruction to the horizontal range of view is haze, which may or may not co-exist with the other obstructions, and is supposed to consist of minute particles of water, dust, and smoke floating in the air. The haze, unlike the abrupt obstructions to the view, apparently gradually increases with the distance from the observer till objects become invisible at the distance of three or four miles up to seventy, &c., miles."

Mr. Cruikshanks also gives the following table showing the mean results of twenty-one years' observations made at the middle of the day on terrestrial objects such as hills and mountains:—

Under 5 miles. Seen on days.	5 miles but under 10 miles. Seen on days.	10 miles but under 20 miles. Seen on days.	20 miles but under 30 miles. Seen on days.	30 miles but under 40 miles. Seen on days.	40 miles but under 50 miles. Seen on days.	50 miles. Seen on days.
19	—	—	—	—	—	—
81	81	—	—	—	—	—
41	41	41	—	—	—	—
49	49	49	49	—	—	—
38	38	38	38	38	—	—
48	48	48	48	48	48	—
90	90	90	90	90	90	90
366	347	266	225	176	138	90

From this table it appears that during the twenty-one years there were 366 days per annum when an object under five miles distance could be seen, and only ninety days when an object fifty miles distant could be seen.

It has lately appeared to me that the strongest beam should be dipped lower than my brother proposed, and as is now everywhere adopted.

The best of the light should certainly be directed to the place where the safety of shipping most requires it. Now it may in most cases be laid down as axiomatic that the peril of any vessel is inversely proportional to her distance from the danger, whether that danger be a lee shore or an insulated rock. Confining ourselves to this one view of the subject, it would follow that the strongest of the light should, in hazy states of the atmosphere, be thrown as near to the shore, or the rock, as would admit of vessels keeping clear of the danger. But such a restriction as this would, if permanent, greatly impair the usefulness of the light by unduly curtailing its range in clear states of the atmosphere; and of course, *ceteris paribus*, the farther off a sailor is warned of his approach to the shore the better and safer. Besides, the loss due to atmospheric absorption increases in a geometric ratio, and as the rays diverge in cones from the apparatus, the power of the light is further decreased in the inverse ratio of the squares of the distances from the shore.

It is of course well known that the sun itself is extinguished by fog, and we cannot expect to compete with that luminary. But seeing there are endless variations in the density of fogs and in the transparency of the air when there is no fog properly so called, it always appeared to me that had we an easy way of doing so, we ought to increase temporarily the dip of the light, and thus during haze and fogs to direct the strongest beam to a point much nearer the shore than the sea horizon. At present we direct our strongest light not only in clear weather, when it can be seen, but also during fogs, when it cannot possibly be seen, to a part of the sea where the danger to shipping is in most situations the smallest, and this is done to the detriment of that region where, even when the weather is hazy, there is at least some chance of the light being visible, and to a part of the sea where the danger to shipping is unquestionably the greatest.

The simplest mode of depressing the light temporarily would be to raise the lamp itself in relation to the focal plane of the lens. But this is, for several reasons, very inexpedient. The proper adjustment of the apparatus to the focus, so as to secure